

and partly borrowed: the latter vary in quality; the former are, without exception, the worst we have seen for a long time.

Proceedings of the Bristol Naturalists' Society, n. s. vol. v. (1886-87), pt. ii. pp. 95-206: *Engineering Section*, pp. 1-94. Bristol, 1887.

THIS part of the Bristol Naturalists' Society's Proceedings opens with a paper on "Bristol Building Stones" by Prof. Lloyd Morgan; the various local rocks available for the purpose are described, the principal buildings constructed of them being mentioned, and particulars of their resistance given. In a second paper, "On the Origin of Mountain-Ranges," Prof. Morgan criticizes Mr. Mellard Reade's views, and offers some general suggestions on this difficult subject. Further geological information appears in the Engineering Section, Mr. Charles Richardson giving a valuable paper on the Severn Tunnel. Several interesting and useful sections are given as illustrations to the thirty pages of text; and the whole forms, with some notes by Prof. Morgan, an important contribution to local and applied geology.

In the Botanical Section Mr. J. W. White contributes some supplemental notes to the "Flora of the Bristol Coal-field," and Mr. C. Bucknall continues his valuable papers on the Fungi of the Bristol district, illustrating this portion of his work with four plates. Some interesting notes apropos of the tercentenary of the potato are contributed by Mr. G. F. Burder.

Local Zoology is taken in charge by Mr. H. J. Charbonnier, who catalogues the Reptilia, Amphibia, and Pisces observed by him in the district.

The local Meteorology is chronicled by Messrs. G. F. Burder and H. B. Jupp.

Many short papers and abstracts of papers also appear in this part ii., amongst which we may mention:—E. W. Phibbs, "Note on a Sacred War Trophy from Ecuador, consisting of a Human Scalp and Face;" W. P. Mendham, "The Deposition of Smoke and Dust by means of Electricity;" Prof. W. Ramsay, "On Colour Blindness;" Thomas Morgan, "Chilled Iron;" J. W. I. Harvey, "On the Method adopted to Compound a Pair of Ordinary Oscillating Paddle-wheel Engines;" and G. W. Sutcliffe, "Notes on Stationary Engines."

MISCELLANEOUS.

On the "Nursing"-habits of Dendrobates, as observed by A. Kappler.
By G. A. BOULENGER.

A SHORT time ago Messrs. Cope and H. S. Smith* announced the startling discovery that a South-American frog, *Dendrobates braccatus*, Cope, carries its tadpoles on its back; these tadpoles differ in no respect from the normal type, and simply adhere (by the mouth?) to the back of the parent. Mr. Smith observes that the tadpoles "were moist and glistening, as if they had just been taken from water, though the sun was shining hotly over them." It is a great

* Amer. Nat. 1887, p. 307.

pity that Mr. Cope, who describes the specimen on which the larvæ were found, should not have taken the trouble of ascertaining its sex, instead of contenting himself with the statement "The free tadpole is carried on the parent."

The explanation of this extraordinary mode of "nursing" is to be found in a contribution by Hr. Aug. Kappler * to the life-history of Reptiles and Batrachians in Dutch Guiana. We have here to do with a quite new mode of parental provision for the safe rearing of the brood, and I append a translation of Hr. Kappler's remarks:—

"*Dendrobates trivittatus*, Spix.

"During the rainy season the female oviposits in small puddles, where the eggs are hatched, after which the frog removes the young tadpoles to other (larger) puddles. This is accomplished, as I have myself several times witnessed, by the frog entering the water, when all the tadpoles gather round and suck on to the parent, which leaves on its journey with an investment of from twelve to eighteen young tadpoles, 6 or 7 millim. long. Whether it is the male or the female that undertakes the carriage is unknown to me."

It is to be hoped that Messrs. Smith and Kappler's interesting observations may be before long supplemented by fuller accounts. Naturalists in the tropics do not seem to be fully aware of the rich mine of investigation which the breeding-habits of Batrachians afford them. The more our knowledge advances the more we realize the immense amount of secondary modifications in the development of Batrachians, quite irrespective of their relationships. What is more remarkable than the similarity of the eggs and the nursing-habits of such widely remote forms as *Alytes*, *Ichthyophis*, *Desmognathus*, and *Amphiuma*?

It is, however, held by Mr. Ryder † that this similarity between *Ichthyophis* and *Amphiuma* is "a confirmation of Prof. Cope's conclusions as to the taxonomic relations of these two types, and a very interesting instance of the way in which embryological data may become available."

On the Formation of the Antherozoids of the Hepaticæ.

By M. LECLERC DU SABLON.

The antheridia of the Hepaticæ are formed by an aggregation of rounded or oval cells. The cells of the superficial layers remain sterile and form the envelope; the interior cells play a more important part—each of them forms a motile antherozoid, capable of fecundating the oosphere and converting it into an ovum.

How does a cell, formed of a nucleus surrounded by protoplasm and a membrane, become converted into a spiral filament endowed with motion? The authors who have studied the formation of the antherozoids have answered this question in very different ways. According to some the nucleus disappears, and it is the protoplasm that furnishes the spiral filament; according to others the protoplasm does not perform any essential part, and it is the nucleus that, by elongating and coiling itself, directly forms the antherozoid. At the close of my researches upon the Hepaticæ I shall propose a third

* Das Ausland, 1885, p. 858.

† Amer. Nat. 1888, p. 182.